



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/585,793 | 07/12/2006 | Masahide Shima | 03200PCT | 6046 |
| 23165 7590 09/12/2008 ROBERT J JACOBSON PA 650 BRIMHALL STREET SOUTH ST PAUL, MN 551161511 | | | | |
| EXAMINER | | | | |
| CHO, JENNIFER Y | | | | |
| ART UNIT | | PAPER NUMBER | | |
| 1621 | | | | |
| MAIL DATE | | DELIVERY MODE | | |
| 09/12/2008 | | PAPER | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/585,793

Applicant(s)

SHIMA ET AL.

Examiner

JENNIFER Y. CHO

Art Unit

1621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 June 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

Detailed Action

Detailed Action

Receipt is acknowledged of the Response filed 6/10/08.

Claims 1 and 3-11 are pending in this application. Claim 2 has been cancelled.

Claims 7-11 are newly added.

Claim Rejections – 35 USC 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 10 provides for the use of acrylic acid as a raw material for producing a water-absorbent resin, but since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim 10 is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and

Art Unit: 1621

Clinical Products, Ltd. v. Brenner, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

See MPEP 2173.05(q).

Claim Rejections - 35 USC 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 4, 6-9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unverricht et al. (US 6,525,217), in view of Hoyt (US 2,558,520), further in view of Kondo et al. (US 4,880,886).

The instant claims are drawn to a process for producing acrylic acid by vaporizing a material containing an aqueous glycerol solution, containing not more than 20% by weight of water, to generate a first gas. The glycerol and first gas is dehydrated

Art Unit: 1621

in a gas phase. The gaseous reaction product is then oxidized in the gas phase to acrylic acid. The acrylic acid is used to produce a water-absorbent resin.

Unverricht et al. teaches a two-step process for the catalytic gas-phase oxidation of propene to acrolein and then a second reaction of acrolein to acrylic acid (abstract), using molecular oxygen (column 1, line 20). The process uses an inert gas, composed of nitrogen (column 2, lines 27-30), carbon dioxide gas and noble (inert) gas (column 14, lines 37-41). The inert gas can be used to a concentration of $\geq 50\%$ by volume (column 14, lines 26-29).

Unverricht et al. is deficient in that it does not teach the vaporization and dehydration of an aqueous glycerol solution, containing not more than 20% by weight of water, to a gaseous product.

Hoyt et al. teaches the vaporization and dehydration of an aqueous glycerol solution, containing 5% by weight of water, to acrolein, as a gaseous product (column 2, lines 3-13; column 4, lines 7-11).

Hoyt et al. is deficient in that it does not teach that the acrylic acid is used to produce a water-absorbent resin or teach the resin itself.

Kondo et al. teaches acrylic acid used to produce a water-absorbent resin, and the water-absorbent resin itself (abstract).

Therefore, it would be prima facie obvious to one of ordinary skill in the art at the time of the invention, to substitute Hoyt et al.'s starting material, glycerol, for Unverricht et al.'s starting material, propene, based on the availability and cost of the starting materials and reagents. One of ordinary skill in the art would be motivated to use

Art Unit: 1621

different starting materials to arrive at the same intermediate product acrolein, with the reasonable expectation that operations would be facilitated and costs would decrease. It would also be prima facie obvious to one of ordinary skill in the art at the time of the invention, to use Hoyt et al. and Unverricht et al.'s acrylic acid to produce Kondo et al.'s water-absorbent resin. Absent any showing of unusual and/or unexpected results over Applicant's particular reaction steps, acrylic acid or resin, the art obtains the same effect on the purity and yield of acrolein, acrylic acid and resin. Furthermore, the limitations in some of the dependent claims, not expressly taught in the art, are also deemed to be obvious. One of ordinary skill in the art would be motivated to make fine adjustments and optimize these parameters to arrive at the instantly claimed invention. The expected result would be the efficient production of acrylic acid for the chemical industry.

Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unverricht et al. (US 6,525,217), in view of Hoyt (US 2,558,520), further in view of Unverricht et al. (US 6,403,829).

The teaching of Unverricht et al. (US 6,525,217), in view of Hoyt (US 2,558,520) was discussed earlier.

However, Unverricht et al., in view of Hoyt, is deficient in the sense that it does not teach the production of acrylic acid in a two-stage, tandem-type reactor.

The addition of Unverricht et al. (US 6,403,829) teaches a two-zone tube-bundle reactor (column 10, line 1), which gives a two-stage gas-phase oxidation (column 10, line 27).

Therefore, it would be prima facie obvious to one of ordinary skill in the art at the time of the invention, to utilize the two-zone reactor of Unverricht et al. (US 6,403,829), for Unverricht et al., in view of Hoyt et al's production of acrylic acid from the dehydration of glycerol, followed by gas phase oxidation of acrolein. The expected result would be the production of acrylic acid from glycerol in high yield.

Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unverricht et al. (US 6,525,217), in view of Hoyt (US 2,558,520), further in view of Uchida et al. (US 4,871,700).

The teaching of Unverricht et al. (US 6,525,217), in view of Hoyt (US 2,558,520) was discussed earlier.

However, Unverricht et al., in view of Hoyt et al. is deficient in the sense that it does not teach the production of acrylic acid in a single-type reactor.

The addition of Uchida et al. teaches a single tubular reactor (column 8, line 41) for the formation of acrylic acid and acrolein (column 8, lines 53-54).

Therefore, it would be prima facie obvious to one of ordinary skill in the art at the time of the invention, to utilize the single tubular reactor of Uchida et al. for Unverricht et al., in view of Hoyt et al's production of acrylic acid from the dehydration of glycerol,

followed by gas phase oxidation of acrolein. The expected result would be the production of acrylic acid from glycerol in high yield.

Response to Arguments

Applicant's arguments have been considered but are not persuasive for the following reasons:

The Examiner acknowledges Applicant's argument that claim 1 is conducted in the gas phase, while Hoyt et al. is conducted in the liquid phase.

The Examiner contends, however that Hoyt et al. teaches the hydrocarbon is a liquid while it is fed to the reaction (column 4, line 18). The art is silent as to the phase of the reaction. Additionally, the art teaches the temperature of the reaction is conducted at 275 - 325°C (column 3, line 24). Applicant's specification teaches a reaction temperature of 200 - 370°C, which substantially overlaps with Hoyt et al.'s temperature range.

The Examiner acknowledges Applicant's argument that there is no motivation to combine the two references.

In response to Applicant's argument that there is no suggestion to combine the references, the Examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re*

Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it is permissible for the Examiner to rely on disclosures, which fairly teach embodiments of Applicant's invention. The claims require a multitude of elements and it is reasonable for one of ordinary skill in the art to consider these elements being used together.

The Examiner acknowledges Applicant's argument that the problem of the generation of tar is not acknowledged in *Hoyt et al.*

The Examiner, contends however, that the claims are not drawn to a specific purity level, nor are the claims drawn to the elimination of tar. Applicants argue the suitability of the industrial process, however, these arguments are not commensurate with the scope of the claims as drawn.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 1621

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer Y. Cho whose telephone number is (571) 272 6246. The examiner can normally be reached on 9 AM - 6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel Sullivan can be reached on (571) 272 0779. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jennifer Cho
Patent Examiner
Art Unit: 1621

/SHAILENDRA - KUMAR/
Primary Examiner, Art Unit 1621